Telecommunications Standardisation sector
Study Group 15
Experts Group for Video Coding and Systems
in ATM and Other Network environments

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Source: KPN and BT
Title: An AAL for variable bit rate services
Purpose: Proposal

1. Introduction

The attached Liaison Statement from ETSI NA5 was produced at the recent meeting of NA5's Support for Audio-visual and Multimedia (SAM) services rapporteur work group, at Ipswich on 9-10 January 1995.

The meeting was attended by the following companies who unanimously agreed the attached statement:

> BT, CSELT, Cable & Wireless/Mercury, Ericsson, I.A.E.I, INESC, France Telecom, GPT, Tele Danmark, KPN (PTT Research), Nokia, Telia Research, Texas Instruments

The statement outlines SAM's current progress on an AAL definition for variable bit rate services which still needs further development. NA5 offers this statement to assist SG15 in its development of an AAL for variable bit rate services and would welcome any comments on the document's content for consideration at future SAM meetings.

To: ITU-T SG15 AVC EXPERTS GROUP
From: ETSI NA5

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Subject: An AAL for variable bit rate services

2. Introduction

ETSI NA5 SAM has discussed the requirements for an AAL for Variable Bit Rate (VBR) services. This liaison statement provides a summary of these discussions, listing the requirements identified for this AAL and offering a proposal.

The existing placeholder for such an AAL within I.363 is called AAL2.

3. VBR service specific functions

This section lists the VBR service specific requirements and functions as identified by ETSI/NA5 SAM. With variable bit rate, piecewise constant bit rate is meant. The only VBR service, so far considered, is MPEG.

- Means should be provided for detection and recovery of lost or misinserted cells.
- Means should be provided to either correct for CDV introduced by the network or pass CDV information to the next higher (application) layer.
- Bit rate recovery.

4. Positioning of VBR service specific functions

Two options were identified to position the functionalities described in Section 2.

One solution is to place the VBR service specific adaptation functions in the convergence sublayer (CS) header of AAL2 as assumed in section 4.

Another solution is to place the VBR service specific adaptation functions in an upper layer, for example the H.222.1 layer as defined for MPEG. This could use the AAL1 SAR with null CS or the AAL5 SAR and CPCS with a null SSCS.

5. Layout of the SAR PDU

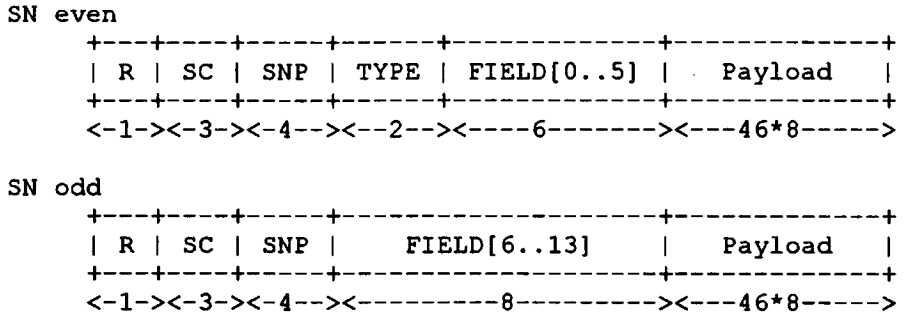
The AAL1 SAR is used as a starting point for defining the SAR of this AAL.

In order to recover effectively from cell loss, it was decided to have a known number of user bytes in the SAR-PDU, and not include any optional bytes that reduce the number of user bytes in the SAR-PDU; consequently the CSI bit is not needed.

There is no provision for structured data transfer, SRTS, or for FEC and interleaving as defined in AAL1 as these are not needed to satisfy the requirements listed above.

A 4 bit Sequence Number field (SN) and a 4 bit Sequence Number Protection field (SNP) is used. The most significant bit of the SN is a reserved bit (R) and the other three bits are for sequence count (SC), which counts from 0 to 7. In all cases there is a one byte field for the convergence sub-layer header (CS-HDR) and 46 bytes of CS-PDU.

When the SN is even, the CS-HDR contains two bits to indicate the type of field present in the header and the most significant six bits of that field. When the SN is odd, the CS-HDR contains the remaining 8 bits of the field. In total 14 bits are available to carry the CS field. This is shown below, with field lengths indicated in bits:



The type field is used to indicate one of four possible types:

Type	Field
00	Bit rate
01	Time stamp
10,11	For future use

The time stamp is a 14 bit field that contains a sample of a counter, Ct, driven by a clock, fnx, where fnx = fn / x, and fn is the network clock frequency, e.g. 155.52MHz, and x is an integer that is a power of two. Note: this is the same mechanism as used in AAL1 for SRTS, except that in this case the full timestamp is transmitted, while in AAL1 only the residual part is transmitted. When fn = 155.52 MHz, and x = 128, fnx = 1.22 MHz, and the counter will wrap around to zero after 13.48 ms.

The bit rate is a 14 bit field that indicates the current number of bits transmitted per second: the bit rate is assumed to be piecewise constant, as indicated by the values of bit rate. Note: the error on the estimate of the value of the counter, Ct, for a cell without an explicit timestamp is proportional to the percentage error on the encoded value of bit rate and to the time since the last timestamp was received. The coding of the bit rate field should therefore be defined on a logarithmic scale, so that the percentage error due to coding of the actual value into a finite length field is independent of the magnitude of the bit rate. This also allows a large range of bit rates to be encoded in a 14 bit field.

If these field lengths are found to be inadequate for some applications, it will be possible to extend the range of the fields. This is for future study.

6. Conclusion

ETSI NA5 SAM is still considering the options listed in section 3 and would appreciate SG15's advice.

END